ESA section 7 Consultation Number F/NWR/2001/01426

National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Consultation Biological Opinion and Magnuson–Stevens Act Essential Fish Habitat Consultation

Action Agencies: The National Marine Fisheries Service (NOAA Fisheries)
The U.S. Geological Survey (USGS)
The Bonneville Power Administration (BPA)
The U.S. Fish and Wildlife Service (FWS)
The U.S. Bureau of Reclamation (BOR)
The U.S. Bureau of Indian Affairs (BIA)

Species/ESUs Affected: Middle Columbia River (MCR) steelhead (*Oncorhynchus mykiss*)

Activities Considered:

1. Issuance of Permit No. 1317 to the United States Geological Survey (USGS).
2. Issuance of Permit No. 1345 to The Washington Department of Fish and Wildlife (WDFW).
3. Issuance of Permit No. 1365 to the Confederated Tribes of the Umatilla Indian Reservation (CTUIR).
4. Issuance of Permit No. 1367 to NOAA Fisheries' Northwest Fisheries Science Center (NWFSC).
5. Issuance of Permit No. 1382 to Utah State University (USU).
6. Issuance of Permit No. 1383 to the USGS.
7. Issuance of Permit No. 1386 to the Washington State Department of Ecology (WDOE).
8. Section 7 consultation on a research action proposed by the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO).

Consultation Conducted by: The Protected Resources Division (PRD), Northwest Region, NOAA Fisheries Consultation Number F/NWR/2001/01426.

This Biological Opinion (Opinion) constitutes NOAA Fisheries' review of seven ESA section 10(a)(1)(A) permits actions and one proposed research action that could affect MCR steelhead. It has been prepared in accordance with section 7 of the ESA of 1973, as amended (16 U.S.C. 1531 et seq.). It is based on information provided in the applications for the proposed permits and permit modifications, published and unpublished scientific information on the biology and ecology of threatened steelhead in the action area, and other sources of information. A complete administrative record of this consultation is on file with the PRD in Portland, Oregon.

Approved by: for D. Robert Lohn, Regional Administrator
Date: 8/1/02 (**Expires on:** December 31, 2006)

CONSULTATION HISTORY

NOAA Fisheries proposes to issue seven permits and thereby authorize the permit holders to conduct scientific research on threatened MCR steelhead. NOAA Fisheries further proposes to consult on a research action advocated by the CTWSRO in the Deschutes River, Oregon. The Northwest Region's PRD decided to group these actions in a single consultation pursuant to 50 CFR 402.14(c) because they are similar in nature and duration and will affect the same threatened species. Though some of these actions may affect other species as well, this Opinion constitutes formal consultation and an analysis of effects solely for MCR steelhead. The consultation histories for each of the proposed actions are described below.

Permit No. 1317—for the USGS.

On February 6, 2001, the PRD received a research permit application from the USGS in Cook, Washington. The PRD subsequently asked for, and received on May 17, 2001, a number of clarifications regarding the application. On February 4, 2002, the PRD received a request to modify the permit, and then further adjustments were requested on May 4, 2002.

Permit No. 1345—for the WDFW

On June 8, 2001, the PRD received an amended permit application from the WDFW to take various listed salmonid species in the Puget Sound and in the Columbia and Snake River basins during the course of evaluating Washington State's warmwater fisheries. The original request was for two studies, but only one of them was funded and received a permit. The amended application constitutes a request to begin the second study.

Permit No. 1365—for the CTUIR

On February 7, 2002, the PRD received a permit application from the CTUIR to take adult MCR steelhead in the Walla Walla River during the course of radio telemetry research into fish distribution in the subbasin. The PRD subsequently asked for, and received on May 20, 2002, a set of clarifications of the material contained in the application.

Permit No. 1367—for the NWFSC

On September 10, 2001, the PRD received an application from the NWFSC. The application was accompanied by a research proposal to study growth rate modulation in spring chinook salmon supplementation.

Permit No. 1382—for USU.

On March 27, 2002, the PRD received a permit application from USU to take MCR steelhead during the course of research on bull trout (*Salvelinus confluentis*) for the USFWS. The PRD subsequently asked for, and received on May 21, 2002, a number of clarifications regarding the research application.

Permit No. 1383—for the USGS

On March 28, 2002, the PRD received a research permit application from the Columbia River Research Laboratory of the USGS. The PRD subsequently requested, and received on May 16, 2002, an updated version of the application with some clarifications.

Permit No. 1386—for the WDOE

On May 13, 2002, the PRD received a research permit application from the WDOE. The PRD subsequently requested, and received on May 16, 2002, an updated version of the application with some clarifications.

Research Action 1—for the CTWSRO

On April 24, 2001, the BIA sent PRD a request for consultation on behalf of the CTWSRO. (Though discussions about the project actually began in late 2000.) The PRD subsequently requested—and received—a number of clarifications regarding the consultation request.

The complete histories for all these proposed actions may be found in the administrative record the PRD maintains for this consultation in Portland, Oregon.

DESCRIPTION OF THE PROPOSED ACTIONS

Common Elements among the Proposed Actions

First, NOAA Fisheries proposes that all of the permit actions considered in this Opinion should be in effect until December 31, 2006. Also, in all instances where a permit holder does not expect to indirectly kill any juvenile MCR steelhead during the course of his or her work, the indirect lethal take figure has been set at one. The reason for this is that unforseen circumstances can arise on occasion and NOAA Fisheries has determined it is best in these instances to include modest overestimates of expected take. By doing this, NOAA Fisheries gives researchers enough flexibility to make in-season research protocol adjustments in response to annual fluctuations in environmental conditions—such as water flows, larger than expected run sizes, etc.—without having to shut down the research because the expected take was exceeded. Also, high take estimates are useful for conservatively analyzing the effects of the actions because it allows accidents that could cause higher-than-expected take levels to be included in the analysis.

Research permits lay out the general and special conditions to be followed before, during, and after the research activities are conducted—as do incidental take statements (ITSs) associated with ESA section 7 consultations. These conditions are intended to (a) manage the interaction between scientists and ESA-listed salmonids by requiring that research activities be coordinated among permit holders and between permit holders and NOAA Fisheries, (b) require measures to minimize impacts on listed species, and (c) report to NOAA Fisheries information on the effects the permitted activities have on the species concerned. The following conditions are common to all of the permits (conditions for the CTWSRO research action are given in the ITS). In all cases, the permit holder must:

1. Anesthetize each ESA-listed fish that is handled out-of-water. Anesthetized fish must be allowed to recover (e.g., in a recovery tank) before being released. Fish that are simply counted must remain in water and do not need to be anesthetized.

2. Handle each ESA-listed fish with extreme care and keep them in water to the maximum extent possible during sampling and processing procedures. The holding units must contain adequate amounts of well-circulated water. When using gear that captures a mix of species, ESA-listed fish must be processed first to minimize the duration of handling stress. The transfer of ESA-listed fish must be conducted using a sanctuary net when necessary to prevent the added stress of an out-of-water transfer.

3. Stop handling ESA-listed juvenile fish if the water temperature exceeds 70 degrees Fahrenheit at the capture site. Under these conditions, ESA-listed fish may only be identified and counted.

4. Use a sterilized needle for each individual injection when using a passive integrated transponder tag (PIT-tag) to mark ESA-listed fish. This is done to minimize the transfer of pathogens between fish.

5. Notify NOAA Fisheries in advance of any changes in sampling locations or research protocols and obtain approval before implementing those changes.

6. Not intentionally kill (or cause to be killed) any ESA-listed species the permit authorizes to be taken, unless the permit allows lethal take.

7. Exercise due caution during spawning ground surveys to avoid disturbing, disrupting, or harassing ESA-listed adult salmonids when they are spawning. Whenever possible, walking in the stream must be avoided—especially in areas where ESA-listed salmonids are likely to spawn.

8. Use visual observation protocols instead of intrusive sampling methods whenever possible. This is especially appropriate when merely ascertaining whether anadromous fish are present. Snorkeling and streamside surveys should replace electrofishing procedures whenever possible.

9. Comply with NOAA Fisheries' backpack electrofishing guidelines when using backpack electroshocking equipment to collect ESA-listed fish.

10. Report to NOAA Fisheries whenever the authorized level of take is exceeded or if circumstances indicate that such an event is imminent. Notification should be made as soon as possible, but no later than two days after the authorized level of take is exceeded. Researchers must then submit a detailed written report. Pending review of these circumstances, NOAA Fisheries may suspend research activities or reinitiate consultation before allowing research activities to continue.

11. Submit to NOAA Fisheries a post-season report summarizing the results of the research. The report must include a detailed description of activities, the total number of fish taken at each location, an estimate of the number of ESA-listed fish taken at each location, the manner of take, the dates/locations of take, and a discussion of the degree to which the research goals were met.

Any additional permit-specific conditions are included in the descriptions of the respective permits.

Some of the activities identified in the proposed permit actions will be funded by NOAA Fisheries, the USGS, the BPA, the BOR, and the FWS. Although these agencies are also responsible for complying with section 7 of the ESA because they are funding activities that may affect listed species, this consultation examines the activities they propose to fund and thus will fulfill their section 7 consultation requirement. It also explicitly fulfills the BIA's section 7 obligations.

Finally, NOAA Fisheries will monitor the actual number of listed fish taken annually in the scientific research activities (as provided to NOAA Fisheries in annual reports or by other means) and shall adjust annual permitted take levels if they are deemed to be excessive or if cumulative take levels rise to the level where they are detrimental to the listed species.

The Individual Permits

The following table displays the overall amounts of take being requested in each permit application and the general actions with which that take would be associated. "Take" is defined in section 3 of the ESA; it means to harass, harm, pursue, hunt, shoot, wound, kill, trap capture or collect [a listed species] or to attempt to engage in any such conduct. The table's purpose is to depict the total impact—strictly in terms of pure take numbers—that can be expected from the proposed research activities. Detailed, action-by-action breakdowns (i.e., how much take is associated with each activity in each permit) are found in the Determination of Effects section.

Table 1. Summary of the Proposed Research Permits Considered in this Biological Opinion.

Permit No.	*Adult MCR Steelhead Take Requested (per year)*	*Juvenile MCR Steelhead Take Requested (per year)*	*Proposed Activities*	*Location(s)*
1317	20 Indirect Mortality: 3	1,500 Indirect mortality: 75	Capture/handle/mark/sample/release	Toppenish Creek
1345	7 Indirect mortality: 0	114 Indirect mortality: 4	Capture/handle/release	The Yakima River
1365	45 Indirect mortality: 4	0	Capture/handle/mark/release	The Walla Walla River
1367	0	15 Indirect Mortality: 1	Capture/handle/release	The Yakima River
1382	0	300 Indirect Mortality: 7	Observe/capture/handle/release	The Walla Walla River and Mill Creek
1383	30 Indirect Mortality: 0	6,150 Indirect Mortality: 102	Observe/capture/handle/ release	Numerous Tributaries to the White Salmon, Klickitat, Hood, and Columbia Rivers.
1386	8 Indirect mortality: 0	40 Indirect Mortality: 1	Capture/handle release	Klickitat and Little Klickitat Rivers, Lake Wallula
Research Action 1	20 Indirect mortality: 2	0	Capture/handle/release	The Deschutes River

*Indirect mortality represents fish that are killed by accident when the research is conducted; direct mortality would represent fish that are killed on purpose as part of the research.

Some of the permit requests described in the following pages seek to take other listed salmonids along with MCR steelhead (e.g., lower Columbia River steelhead, lower Columbia River chinook). The effects of taking those other species are described in other biological opinions and are not relevant to this consultation. Therefore, only those portions of the proposed research activities that would affect MCR steelhead are discussed here.

Permit 1317—Modification 1:

Permit 1317 would authorize the USGS to annually take juvenile and adult MCR steelhead during the course of research activities on the Toppenish National Wildlife Refuge (TNWR), Toppenish Creek, Washington. The purpose of the study is to determine whether juvenile MCR steelhead enter the TNWR's wetland management units during the spring flooding of Toppenish Creek and become trapped there—thus becoming vulnerable to avian predators, high summer water temperatures, and stranding. The study will benefit MCR steelhead by showing whether they are (a) straying into the wetland management units and (b) managing to escape back to Toppenish Creek to continue their downstream migration. If the juvenile (or adult) MCR steelhead are being trapped in the management units by falling water levels, the study will also be used to help guide TNWR operations so that the fish are less likely to be harmed in the future. The USGS proposes to capture, handle, tag, and release juvenile MCR steelhead. They also intend to non-lethally sample gill tissue from some of the captured juveniles; any adults captured will simply be released as soon as possible. Fyke-net traps will be the primary capture method, but minnow traps, snorkeling, or electrofishing may be used if the traps are not successful. The USGS also asks to be allowed to take adult steelhead that may inadvertently be caught in the traps. In addition, the USGS requests take for juvenile and adult MCR steelhead that may be killed as an indirect result of the research.

Permit 1345—Amendment 1:

Permit 1345 would authorize the WDFW to annually take juvenile and adult MCR steelhead during the course of research designed to determine the effects gravel pit mining has on salmonids in the Yakima River, Washington. The research will examine the question of whether connecting the Yakima River to area gravel pits can enhance rearing habitat for juvenile salmonids—particularly MCR steelhead. The study will benefit MCR steelhead by helping determine if they are immigrating into gravel pit ponds that are already connected to the river, documenting the presence/absence of warmwarter predator species in those ponds, and helping ascertain (a) where future gravel mining operations can best be sited, (b) whether any gravel mining ponds should be connected to the river, and (c) how such ponds can best be constructed to benefit salmonids in the future. The researchers propose to use boat electrofishing equipment in several river reaches near gravel mining ponds connected to the river as well as in some of the ponds themselves. They will capture, handle, and rapidly release any juvenile MCR steelhead encountered. If any adults are encountered they would not be captured. The WDFW is also requesting take for any juvenile MCR steelhead that may be killed as an indirect result of the research.

Permit 1365:

Permit 1365 would authorize the CTUIR to annually take adult steelhead during the course of scientific research in the Walla Walla River subbasin, Washington. The study is designed to evaluate the effectiveness of recently-constructed adult bypass facilities in the subbasin. It will benefit MCR steelhead by determining where in the Walla Walla subbasin passage barriers still exist (if any) and showing the spawning distribution of MCR steelhead in the subbasin—information that will be used to help develop a subbasinwide recovery strategy for the listed fish. The researchers plan to capture the adult MCR steelhead using a variety of techniques: hook and line with barbless hooks, trapping, seining, and dip netting. Some of the fish will simply be measured and released, but most will also be fitted with radio tags before release. These fish will then be tracked with both permanent and mobile tracking units to determine where in the subbasin they go. The CTUIR is also requesting take for adult MCR steelhead that may be killed as an inadvertent result of the capture and tagging procedures.

Permit 1367:

Permit 1367 would authorize the NWFSC to take juvenile MCR steelhead during the course of research designed to assess the incidence of precocious maturation among spring chinook salmon in the Yakima River, Washington. The research will confer no direct benefit to MCR steelhead—it also does not target them—but the research will be of aid to all listed fish in the area because it will produce data that will be used in developing conservation (as opposed to production) hatchery plans for state, Federal, and tribal programs throughout the Columbia River basin. The researchers plan to use electrofishing equipment in the Yakima River to capture spring chinook salmon. Any other captured fish—juvenile MCR steelhead in particular—will be identified, allowed to recover from the effects of the capture, and immediately released. The researchers do not expect to encounter any adult MCR steelhead. The NWFSC also requests a small amount of take for juvenile MCR steelhead that may be killed as an inadvertent result of the electrofishing process.

Permit 1382:

Permit 1382 would authorize USU to take juvenile MCR steelhead during the course of research designed to assess bull trout populations and life history characteristics in the Walla Walla River, Washington. The research will confer no direct benefit to MCR steelhead—it also does not target them—but the research will benefit listed bull trout in that it will assess population abundance and rates of population change. These data will then be tied those data to habitat quality and land use in the Walla Walla subbasin and thus assist in the process of recovery planning. MCR steelhead will, however, benefit indirectly from this research because many of the habitat features bull trout require are also important to steelhead and therefore any improvement in those features for the purposes of recovering bull trout will be of help to the local depressed steelhead populations as well. The researchers intend to use a variety of techniques to capture, mark, and monitor bull trout in the Walla Walla River. The techniques that will affect MCR steelhead are snorkel surveys and canoe-mounted electrofishing. During the snorkeling exercise, the fish will simply be observed. Any MCR steelhead captured during the electrofishing operation will be counted and immediately released downstream of where the electrofishing is taking place. The researchers are also requesting take for juvenile MCR steelhead that may be killed as an inadvertent result of the electrofishing operation.

Permit 1383:

Permit 1383 would authorize the USGS to take juvenile and adult MCR steelhead during the course of research designed to evaluate the status of cutthroat trout (*O. clarki*) in the Columbia River basin above Bonneville Dam. The research will directly benefit the listed fish by helping identify and determine the status of MCR steelhead local populations—even though the research does not directly target them. Furthermore, the surveys will generate indirect benefits because the data being gathered will be used to (a) determine sympatric relationships between cutthroat trout and steelhead and, eventually, (b) help restore and recover habitat lost as a result of human activities—both of which will help MCR steelhead in the long run. The researchers intend to use a combination of methods to capture and observe cutthroat trout—snorkeling, electrofishing, seining, minnow trapping, and angling—though snorkeling and electrofishing will be the primary methods. Captured MCR steelhead will be anesthetized, measured, weighed, allowed to recover, and released. The researchers also request take for juvenile MCR steelhead that may be killed as an inadvertent result of the research. Some adults may be taken as well, but none will be killed.

Permit 1386:

Permit 1386 would authorize the WDOE to take juvenile and adult MCR steelhead during the course of research designed to evaluate level of toxic contaminants in surface waters, sediment, and aquatic animal tissues in several areas throughout Washington State. The research will not target listed fish but will benefit them by identifying areas of high toxicity and using that information to help Washington clean up affected waters in accordance with the Clean Water Act. The researchers intend to use a combination of many net types and boat electrofishing to capture the fish. Any listed fish that *are* captured would be released immediately. The researchers also request take for juvenile MCR steelhead that may be killed as an inadvertent result of the research. Some adults may be taken as well, but none will be killed.

Research Action 1:

Under this action, the CTWSRO proposes to use nets to capture fall chinook in the Deschutes River. The information gained from this action will be used to determine the status of the fall chinook stocks in the Columbia River basin and that information, in turn, will be used to set appropriate harvest levels and determine other management actions relating to fall chinook salmon both in the United States and Canada. The researchers will use an 8-inch stretch-mesh gillnet because it can effectively capture a wide size range of fall chinook but is less likely to capture steelhead and jacks (precociously-maturing male spawners). The net will be placed in the lower Deschutes River (Rkm 32) and will be fished every day from July 29 through October 25. The netting will be conducted from 5 to 11 a.m. and from 5 to 11 p.m. and will cover approximately one-third the wetted width of the Deschutes River. This is a fairly intense fishing regime (half of the time over one-third of the river's width for three months) and thus, even though MCR steelhead are not the target of the research, some of them are likely to be inadvertently captured during the research action. Any MCR steelhead that are captured, however, will be measured, assessed as to their condition, and released immediately.

The Action Area

The action area for the proposed research projects comprises a large number of streams and rivers in the MCR subbasin. The actions have the potential to affect the water, substrate, and adjacent riparian zones of estuarine and accessible riverine reaches in several hydrologic units and counties. Accessible reaches are those within the historical range of the MCR ESU that can still be occupied by any steelhead life stage. These include all river reaches accessible to listed steelhead in Columbia River tributaries (except the Snake River) between Mosier Creek in Oregon and the Yakima River in Washington (inclusive). Major river subbasins containing spawning and rearing habitat for this ESU comprise approximately 26,739 square miles in Oregon and Washington. The following counties lie partially or wholly within these subbasins (or contain migration habitat for the species): Oregon—Clatsop, Columbia, Crook, Gilliam, Grant, Harney, Hood River, Jefferson, Morrow, Multnomah, Sherman, Umatilla, Union, Wallowa, Wasco, and Wheeler; Washington—Benton, Clark, Columbia, Cowlitz, Franklin, Kittitas, Klickitat, Pacific, Skamania, Wahkiakum, Walla Walla, and Yakima. More detailed habitat information (i.e., specific watersheds, migration barriers, habitat features, and special management considerations) for MCR steelhead can be found in the February 16, 2000, *Federal Register* notice designating critical habitat (65 FR 7764). It should be noted, however, that the critical habitat designation for MCR steelhead was vacated and remanded to NOAA Fisheries for new rulemaking pursuant to a court order in May of 2002. In the absence of a new rule designating critical habitat for MCR steelhead, this consultation will evaluate the effects of the proposed actions on the species' habitat to determine whether those actions are likely to jeopardize the species' continued existence.

STATUS OF THE SPECIES UNDER THE ENVIRONMENTAL BASELINE

In order to describe a species' status, it is first necessary to define precisely what "species" means in this context. Traditionally, one thinks of the ESA listing process as pertaining to entire taxonomic species of animals or plants. While this is generally true, the ESA also recognizes that there are times when the listing unit must necessarily be a subset of the species as a whole. In these instances, the ESA allows a "distinct population segment" (DPS) of a species to be listed as threatened or endangered. MCR steelhead are just such a DPS and, as such, are for all intents and purposes considered a "species" under the ESA.

NOAA Fisheries developed the approach for defining salmonid DPSs in 1991 (Waples 1991). It states that a population or group of populations is considered distinct if they are ". . . substantially reproductively isolated from conspecific populations," and if they are considered ". . . an important component of the evolutionary legacy of the species." A distinct population or group populations is referred to as an evolutionarily significant unit (ESU) of the species. Hence, MCR steelhead constitute an ESU of the species *O. mykiss*.

The MCR steelhead ESU was listed as threatened on March 25, 1999 (64 FR 14517). It includes all natural-origin populations in the Columbia River basin above the Wind River, Washington, and the Hood River, Oregon, up to and including the Yakima River, Washington. This ESU includes the only populations of inland winter steelhead in the United States (in the Klickitat River, Washington, and Fifteenmile Creek, Oregon). Both the Deschutes River and Umatilla River hatchery stocks are included in the ESU, but are not listed.

The MCR steelhead were listed because NOAA Fisheries determined that a number of factors—both environmental and demographic—had caused them to decline to the point where they were likely to be in danger of going extinct within the foreseeable future. These factors for decline affect MCR steelhead biological requirements at every life stage and they arise from a number of different sources. This section of the Opinion explores those effects and defines the context within which they take place.

Species/ESU Life History

<u>Steelhead</u>

Steelhead can be divided into two basic run types based on their level of sexual maturity at the time they enter fresh water and the duration of the spawning migration (Burgner et al. 1992). The stream-maturing type, or summer steelhead, enters fresh water in a sexually immature condition and requires several months in fresh water to mature and spawn. The ocean-maturing type, or winter steelhead, enters fresh water with well-developed gonads and spawns relatively shortly after river entry (Barnhart 1986). Variations in migration timing exist between populations. Some river basins have both summer and winter steelhead, others only have one run type.

In the Pacific Northwest, summer steelhead enter fresh water between May and October (Busby et al. 1996, Nickelson et al. 1992). During summer and fall, before spawning, they hold in cool, deep pools (Nickelson et al. 1992). They migrate inland toward spawning areas, overwinter in the larger rivers, resume migration to natal streams in early spring, and then spawn (Meehan and Bjornn 1991, Nickelson et al. 1992). Winter steelhead enter fresh water between November and April in the Pacific Northwest (Busby et al. 1996, Nickelson et al. 1992), migrate to spawning areas, and then spawn in late winter or spring.

For more information on steelhead biology please see NOAA Fisheries (2002a), NOAA Fisheries (2000a), and Busby et al. (1996).

MCR Steelhead

Fish in this ESU are predominantly summer steelhead, but winter-run fish are found in the Klickitat River and Fifteenmile Creek. Most fish in this ESU smolt at two years and spend one to two years in salt water before re-entering fresh water, where they may remain up to a year before spawning. Age-2-ocean steelhead dominate the summer steelhead run in the Klickitat River, whereas most other rivers with summer steelhead produce about equal numbers of both age-1- and 2-ocean fish. Juvenile life stages (i.e., eggs, alevins, fry, and parr) inhabit freshwater/riverine areas throughout the range of the ESU. Parr usually undergo a smolt transformation as 2-year-olds, at which time they migrate to the ocean. Subadults and adults forage in coastal and offshore waters of the North Pacific Ocean prior to returning to spawn in their natal streams. A nonanadromous form of *O. mykiss* (redband trout) co-occurs with the anadromous form in this ESU, and juvenile life stages of the two forms can be very difficult to differentiate. In addition, hatchery steelhead are also distributed throughout the range of this ESU. For more information on MCR steelhead life history, please see NOAA Fisheries (2000a) and Busby et al. (1996).

Overview—Status of the MCR Steelhead

To determine a species' status under extant conditions (usually termed "the environmental baseline"), it is necessary to ascertain the degree to which the species' biological requirements are being met at that time and in that action area. For the purposes of this consultation, MCR steelhead biological requirements are expressed in two ways: Population parameters such as fish numbers, distribution, and trends throughout the action area; and the condition of various essential habitat features such as water quality, stream substrates, and food availability. Clearly, these two types of information are interrelated. That is, the condition of a given habitat has a large impact on the number of fish it can support. Nonetheless, it is useful to separate the species' biological requirements into these parameters because doing so provides a more complete picture of all the factors affecting MCR steelhead survival. Therefore, the discussion to follow will be divided into two parts: Species Distribution and Trends; and Factors Affecting the Environmental Baseline.

Species Distribution and Trends

Distribution

Recent adult data for this ESU are summarized in NOAA Fisheries' biological opinion on the operation of the Federal Columbia River Power System (NOAA Fisheries 2000a). Estimates of historical (pre-1960s) abundance specific to this ESU are available for the Yakima River, which had an estimated run size of 100,000 (WDF et al. 1993). Assuming comparable run sizes for other drainage areas in this ESU, the total historical run size may have exceeded 300,000 steelhead.

In 1997, NOAA Fisheries reassessed the status of this ESU (NOAA Fisheries 1997). Updated dam counts from the Deschutes River showed a 5-year geometric mean of approximately 9,700 summer steelhead in recent runs, corresponding to an escapement of 1,400 natural fish. For 1997, steelhead escapement above Sherars Falls included 17,566 stray hatchery steelhead and 1,729 naturally-produced Deschutes River steelhead. Run reconstructions for the Yakima, John Day, and Touchet Rivers estimate that recent natural escapements are 1,000, 10,000, and 300 steelhead, respectively.

There is very little data on the historical numbers of juvenile outmigrants for the MCR steelhead ESU. In recent years however, the juvenile out migration has been estimated at more than 379,000 fish (Schiewe 2002). And more than one-quarter of the MCR steelhead outmigrants (a recent five-year average of 99,235) were produced in the Yakima River system (NOAA Fisheries 2002b).

Trends

For the MCR steelhead ESU as a whole, NOAA Fisheries (2000a) estimates that the median population growth rate over the base period (i.e., data from 1980 to the most recent year available) ranges from 0.88 to 0.75, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of natural origin fish.

Escapements to the Yakima, Umatilla, and Deschutes River subbasins have shown overall upward trends, although all tributary counts in the Deschutes River are downward, and the Yakima River is recovering from extremely low abundance in the early 1980s. The John Day

River probably represents the largest native, naturally-spawning stock in the ESU, and the combined spawner surveys for the John Day River has shown spawner declines of about 15% per year since 1985. NOAA Fisheries, in proposing this ESU for listing as threatened under the ESA, cited low returns to the Yakima River, poor abundance estimates for Klickitat River and Fifteenmile Creek winter steelhead, and an overall decline for naturally producing stocks within the ESU. However, estimates based on dam counts show an overall increase in steelhead abundance, with a relatively stable naturally-produced component.

Hatchery fish are widespread and stray to spawn naturally throughout the region. Recent estimates of the proportion of natural spawners of hatchery origin range from low (Yakima, Walla Walla, and John Day Rivers) to moderate (Umatilla and Deschutes Rivers). Most hatchery production in this ESU is derived primarily from within-basin stocks. One recent area of concern is the increase in the number of Snake River hatchery (and possibly wild) steelhead that stray and spawn naturally within the Deschutes River subbasin. In addition, one of the main threats cited in NOAA Fisheries' listing decision for this species was the fact that hatchery fish constituted a steadily increasing proportion of the natural escapement in the MCR steelhead ESU (Fish Passage Center 2000, Brown 1999).

Thus, the degree to which MCR biological requirements are being met with respect to population numbers and distribution is something of a mixed bag. While some improvement can be seen throughout the ESU as a whole, populations in critical subbasins exhibit continuing declining trends. Therefore, while there is some cause for optimism, there has been no genuine change in the species' status since it was listed, and the most likely scenario is that its biological requirements are not being met with respect to abundance, distribution, and overall trend.

Factors Affecting the Environmental Baseline

Environmental baselines for biological opinions are defined by regulation at 50 CFR 402.02, which states that an environmental baseline is the physical result of all past and present state, Federal, and private activities in the action area along with the anticipated impacts of all proposed Federal projects in the action area (that have already undergone formal or early section 7 consultation). The environmental baseline for *this* biological opinion is therefore the result of the impacts a great many activities (summarized below) have had on MCR steelhead survival and recovery. Put another way (and as touched upon previously), the baseline is the culmination of the effects that multiple activities have had on the species' *biological requirements* and, by examining those individual effects, it is possible to derive the species' status in the action area.

Many of the biological requirements for MCR steelhead in the action area can best be expressed in terms of essential habitat features. That is, the steelhead require adequate: (1) substrate (especially spawning gravel), (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) migration conditions (February 16, 2000, 65 FR 7764). The best scientific information presently available demonstrates that a multitude of factors, past and present, have contributed to the decline of west coast salmonids by adversely affecting these essential habitat features. NOAA Fisheries reviewed much of that information in its recently reinitiated Consultation on Operation of the Federal Columbia River Power System (FCRPS)(NOAA Fisheries 2000a). That review is summarized in the sections below.

It is important to note that while the discussion below concentrates largely on species other than the MCR steelhead, it is simply a case of there being more data on how the various factors for decline have affected those species than exist for the factors' effects on MCR steelhead. The reason for this is that MCR steelhead were listed fairly recently in comparison to, say, Snake River spring/summer chinook (*O. tshawytscha*—listed in 1992). As a result, more studies have been done on how the various factors for decline affect species that were listed further in the past. Nonetheless, even though there is not as much data on the MCR steelhead per se, it can be conclusively stated that the factors affecting every other salmonid species in the Columbia River basin affect MCR steelhead as well. Therefore, in every instance cited below—whether hydropower development or habitat destruction or any other factor—it can be said the MCR steelhead have suffered negative effects similar to those described for the species studied. It should be further noted that the discussion below is simply a solid overview—rather than an exhaustive treatment—of the factors affecting MCR steelhead. For greater detail, please see Busby et al. (1996) and NOAA Fisheries (1991).

<u>The Mainstem Hydropower System</u>

Hydropower development on the Columbia River has dramatically affected anadromous salmonids in the basin. Storage dams have eliminated spawning and rearing habitat and altered the natural hydrograph of the Snake and Columbia Rivers—decreasing spring and summer flows and increasing fall and winter flows. Power operations cause flow levels and river elevations to fluctuate—slowing fish movement through reservoirs, altering riparian ecology, and stranding fish in shallow areas. The 13 dams in the Snake and Columbia River migration corridors kill smolts and adults and alter their migrations. The dams have also converted the once-swift river into a series of slow-moving reservoirs—slowing the smolts' journey to the ocean and creating habitat for predators. Because the MCR steelhead must navigate up to four major hydroelectric projects during their up- and downstream migrations (and experience the effects of other dam operations occurring upstream from their ESU boundary), they feel the influence of all the impacts listed above. For more information on the effects of the mainstem hydropower system, please see NOAA Fisheries (2000a) and NOAA Fisheries (2002a).

Human-Induced Habitat Degradation

The quality and quantity of fresh water habitat in much of the Columbia River basin have declined dramatically in the last 150 years. Forestry, farming, grazing, road construction, hydropower system development, mining, and development have radically changed the historical habitat conditions of the basin. More than 2,500 streams, river segments, and lakes in the Northwest do not meet Federally-approved, state and tribal water quality standards and are now listed as water-quality-limited under Section 303(d) of the Clean Water Act. Tributary water quality problems contribute to poor water quality when sediment and contaminants from the tributaries settle in mainstem reaches and the estuary. Most of the water bodies in Oregon, Washington, and Idaho on the 303(d) list do not meet water quality standards for temperature. High water temperatures adversely affect salmonid metabolism, growth rate, and disease resistance, as well as the timing of adult migrations, fry emergence, and smoltification. Many factors can cause high stream temperatures, but they are primarily related to land-use practices rather than point-source discharges. Some common actions that cause high stream temperatures are the removal of trees or shrubs that directly shade streams, water withdrawals for irrigation or other purposes, and warm irrigation return flows. Loss of wetlands and increases in groundwater withdrawals contribute to lower base-stream flows which, in turn, contribute to temperature increases. Activities that create shallower streams (e.g., channel widening) also cause temperature increases. For more information on the effects associated with habitat degradation—e.g., problems associated with pollution, sedimentation, increased water temperatures, passage barriers, and loss of habitat complexity and refugia—as well as some of the measures being taken to mitigate those effects, please see NOAA Fisheries (2002a).

Hatcheries

For more than 100 years, hatcheries in the Pacific Northwest have been used to (a) produce fish for harvest and (b) replace natural production lost to dam construction and other development—not to protect and rebuild naturally-produced salmonid populations. As a result, most salmonid populations in the region are primarily derived from hatchery fish. In 1987, for example, 95 percent of the coho salmon, 70 percent of the spring chinook salmon, 80 percent of the summer chinook salmon, 50 percent of the fall chinook salmon, and 70 percent of the steelhead returning to the Columbia River basin originated in hatcheries (CBFWA 1990). Because hatcheries have traditionally focused on providing fish for harvest and replacing declines in native runs (and generally not carefully examined their own effects on local populations), it is only recently that the substantial effects of hatcheries on native natural populations been documented. For example, the production of hatchery fish, among other factors, has contributed to the 90 percent reduction in natural coho salmon (*O. kisutch*) runs in the lower Columbia River over the past 30 years (Flagg et al. 1995).

Hatchery fish can harm naturally produced salmon and steelhead in four primary ways: (1) ecological effects, (2) genetic effects, (3) overharvest effects, and (4) masking effects (NOAA Fisheries 2000b). Ecologically, hatchery fish can predate on, displace, and compete with wild fish. These effects are most likely to occur when fish are released in poor condition and do not migrate to marine waters, but rather remain in the streams for extended rearing periods. Hatchery fish also may transmit hatchery-borne diseases, and hatcheries themselves may release disease-carrying effluent into streams. Hatchery fish can affect the genetic composition of native fish by interbreeding with them. Interbreeding can also be caused by humans taking native fish from one area and using them in a hatchery program in another area. Interbred fish are less adapted to the local habitats where the original native stock evolved and may therefore be less productive there. For more information on the adverse effects associated with hatchery operations, please see NOAA Fisheries (2002a).

Harvest

Salmon and steelhead have been harvested in the Columbia basin as long as there have been people there. Commercial fishing developed rapidly with the arrival of European settlers and the advent of canning technologies in the late 1800s. The development of non-Indian fisheries began in about 1830; by 1861, commercial fishing was an important economic activity. The early commercial fisheries used gill nets, seines hauled from shore, traps, and fish wheels. Later, purse seines and trolling (using hook and line) fisheries developed. Recreational (sport fishing) harvest began in the late 1800s and took place primarily in tributary locations (ODFW and WDFW 1998). Steelhead have formed a major component of recreational fisheries for decades. Conservation concerns for natural steelhead have caused regulations to be put in place in Oregon and Washington that strictly limit the number of fish anglers may catch and the types of gear that may be used in many areas.

Initially, the non-Indian fisheries targeted spring and summer chinook salmon, and these runs dominated the commercial harvest during the 1800s. Eventually the combined ocean and freshwater harvest rates for Columbia River spring and summer chinook salmon exceeded 80 percent (and sometimes 90 percent) of the run—accelerating the species' decline (Ricker 1959). From 1938 to 1955, the average harvest rate dropped to about 60 percent of the total spring chinook salmon run and appeared to have a minimal effect on subsequent returns (NOAA Fisheries 1991). Until the spring of 2000—when a relatively large run of hatchery spring chinook salmon returned and provided a small commercial tribal fishery—no commercial season for spring chinook salmon had taken place since 1977. Present Columbia River harvest rates are very low compared with those from the late 1930s through the 1960s (NOAA Fisheries 1991). Though steelhead—MCR steelhead included—were never as important a component of the Columbia basin's fisheries as chinook, net-based fisheries generally do not discriminate among species, so it can fairly be said that harvest has also contributed to the MCR steelhead declines.

For more information on the adverse effects associated with harvest, please see NOAA Fisheries (2002a).

Natural Conditions

Natural changes in the freshwater and marine environments play a major role in salmonid abundance. Recent evidence suggests that marine survival among salmonids fluctuates in response to 20- to 30-year cycles of climatic conditions and ocean productivity (Hare et al. 1999). This phenomenon has been referred to as the Pacific Decadal Oscillation. In addition, large-scale climatic regime shifts, such as El Niño, appear to change ocean productivity. During the first part of the 1990s, much of the Pacific Coast was subject to a series of very dry years. More recently, severe flooding has adversely affected some stocks (e.g., the low returns of Lewis River bright fall chinook salmon in 1999).

A key factor affecting many West Coast stocks—including MCR steelhead—has been a general 30-year decline in ocean productivity. The mechanism whereby stocks are affected is not well understood, partially because the pattern of response to these changing ocean conditions has differed among stocks, presumably due to differences in their ocean timing and distribution. It is presumed that survival is driven largely by events occurring between ocean entry and recruitment to a subadult life stage. For more information on the effects generated by natural processes and conditions, please see NOAA Fisheries (2002a).

Scientific Research

MCR steelhead, like other listed fish, are the subject of scientific research and monitoring activities. Most biological opinions NOAA Fisheries issues recommend specific monitoring, evaluation, and research efforts intended to help gather information that would be used to increase the survival of listed fish. In addition, NOAA Fisheries has issued numerous research permits authorizing takes of ESA-listed fish over the last few years. Currently, there are approximately 50 research actions taking place that affect MCR steelhead. Most of them (32) were authorized under section 4(d) of the ESA (NOAA Fisheries 2002b), the rest were authorized under section 7 in a process exactly like the one being used to examine the currently proposed actions (NOAA Fisheries 2002a). No take authorization, by itself, has the potential to lead to the decline of the species. However the sum of the authorized takes indicate a high level of research effort in the action area and, as anadromous fish stocks have continued to decline, the proportion of fish handled for research/monitoring purposes has increased. The effect of these activities is difficult to assess because despite the fact that fish are harassed and even killed in the course of scientific research, these activities have a great potential to benefit ESA-listed salmon and steelhead. For example, aside from simply increasing what is known about the listed species and their biological requirements, research is essentially the only way to answer key questions associated with difficult resource issues that crop up in every management arena and involve every salmonid life history stage (particularly the resource issues discussed in the previous sections). Perhaps most importantly, the information gained during research and monitoring activities will help resource managers recover listed species. That is, no rational resource allocation or management decisions can be made without the knowledge to back them up. Further, there is no way to tell if the corrective measures described in the previous sections are working unless they are monitored and no way to design new and better ones if research is not done.

In any case, scientific research and monitoring efforts (unlike the other factors described in the previous sections) are not considered to be a factor contributing to the decline of MCR steelhead, and NOAA Fisheries believes that the information derived from the research activities is essential to their survival and recovery. Nonetheless, fish *are* harmed during research activities. And activities that are carried out in a careless or undirected fashion are not likely to benefit the species at all. Therefore, to minimize any harm arising from research activities on the species, NOAA Fisheries imposes conditions in its permits so that permit holders conduct their activities in such a way as to reduce adverse effects—particularly killing as few salmonids as possible. Also, researchers are encouraged to use non-listed fish species and hatchery fish instead of listed naturally-produced fish when possible. In addition, researchers are required to share fish samples, as well as the results of the scientific research, with other researchers and comanagers in the region as a way to avoid duplicative research efforts and to acquire as much information as possible from the ESA-listed fish sampled. NOAA Fisheries also works with other agencies to coordinate research and thereby prevent duplication of effort.

In general, for projects that require a section 10(a)(1)(A) permit, applicants provide NOAA Fisheries with high take estimates to compensate for potential in-season changes in research protocols, accidental catastrophic events, and the annual variability in listed fish numbers. Also, most research projects depend on annual funding and the availability of other resources. So, a specific research project for which take of ESA-listed species is authorized by a permit may be suspended in a year when funding or resources are not available. As a result, the *actual* take in a given year for most research projects, as stated in the projects' post-season annual reports, is usually less than the authorized level of take.

Summary

In conclusion, the picture of whether MCR steelhead biological requirements are being met is more clear-cut for habitat-related parameters than it is for population factors: given all the factors for decline—even taking into account the corrective measures being implemented—it is still clear that the MCR steelhead's biological requirements are currently not being met under the environmental baseline. Thus their status is such that there must be a significant improvement in the environmental conditions of their habitat (over those currently available under the environmental baseline). Any further degradation of the environmental conditions could have a large impact because the species is already at risk. In addition, there must be efforts to minimize impacts caused by dams, harvest, hatchery operations, habitat degradation, and unfavorable natural conditions.

EFFECTS OF THE ACTION

The purpose of this section is to identify what effects NOAA Fisheries' issuance of scientific research permits will have on threatened MCR steelhead. To the extent possible, this will include analyzing effects at the population level. Where information on MCR steelhead is lacking at the population level, this analysis assumes that the status of each affected population is the same as the ESU as a whole. The method NOAA Fisheries uses for evaluating effects is discussed first, followed by discussions of the general effects scientific research activities are known to have and permit-specific effects.

Evaluating the Effects of the Action

Over the course of the last decade and hundreds of ESA section 7 consultations, NOAA Fisheries developed the following four-step approach for applying the ESA Section 7(a)(2) standards when determining what effect a proposed action is likely to have on a given listed species. What follows here is a summary of that approach; for more detail please see *The Habitat Approach: Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Salmonids* (NOAA Fisheries 1999).

1. Define the biological requirements and current status of each listed species.

2. Evaluate the relevance of the environmental baseline to the species' current status.

3. Determine the effects of the proposed or continuing action on listed species and their habitat.

4. Determine whether the species can be expected to survive with an adequate potential for recovery under (a) the effects of the proposed (or continuing) action, (b) the effects of the environmental baseline, and (c) any cumulative effects—including all measures being taken to improve salmonid survival and recovery.

The fourth step above requires a two-part analysis. The first part focuses on the action area and defines the proposed action's effects in terms of the species' biological requirements in that area (i.e., impacts on essential habitat features). The second part focuses on the species itself. It describes the action's impact on individual fish—or populations, or both—and places that impact in the context of the ESU as a whole. Ultimately, the analysis seeks to answer the questions of whether the proposed action is likely to jeopardize a listed species' continued existence or destroy or adversely modify its critical habitat.

Effects on Habitat

Previous sections have detailed the scope of the MCR steelhead habitat in the action area, described the essential features of that habitat, and depicted its present condition. The discussion here focuses on how those features are likely to be affected by the proposed actions.

Full descriptions of the proposed activities are found in the next section. In general, the activities will be (a) electrofishing—using both backpack- and boat-based equipment, (b) snorkel surveys in spawning and rearing habitat, (c) capturing fish with angling equipment, traps, and nets of various types, and (d) marking the captured fish with various types of tags. All of these techniques are minimally intrusive in terms of their effect on habitat. None of them will measurably affect any of the 10 essential fish habitat features listed earlier (i.e., stream substrates, water quality, water quantity, food, streamside vegetation, etc.). Moreover, the proposed activities are all of short duration. Therefore, NOAA Fisheries concludes that the proposed activities are unlikely to have an adverse impact on MCR steelhead habitat.

Effects on MCR Steelhead

The primary effects the proposed activities will have on MCR steelhead will occur in the form of direct "take" (the ESA take definition is given in the section introducing the individual permits) a major portion of which takes the form of harassment. Harassment generally leads to stress and other sub-lethal effects and is caused by observing, capturing, and handling fish. The ESA does not define harassment nor has NOAA Fisheries defined this term through regulation. However, the USFWS defines harassment as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to breeding, feeding or sheltering" [50 CFR 17.3]. For the purposes of this analysis, NOAA Fisheries adopts this definition of harassment.

As Table 1 illustrates, the various proposed activities would cause many types of take, and while there is some blurring of the lines between what constitutes an activity (e.g., electrofishing) and what constitutes a take category (e.g., harm), it is important to keep the two concepts separate. The reason for is this is that the effects being measured here are those which the activity itself has on the listed species. They may be expressed in *terms* of the take categories (e.g., how many MCR steelhead are harmed, or harassed, or even killed), but the actual mechanisms of the effects themselves (i.e., the activities) are the causes of whatever take arises and, as such, they bear examination. Therefore, the first part of this section is devoted to a discussion of the general effects known to be caused by the proposed activities—regardless of where they occur or what species are involved.

The following subsections describe the types of activities being proposed. Because they would all be carried out by trained professionals using established protocols and have widely recognized specific impacts, each activity is described in terms broad enough to apply to every proposed permit. This is especially true in light of the fact that the researchers would not receive a permit unless their activities (e.g., electrofishing) incorporate NOAA Fisheries' uniform, pre-established set of mitigation measures. These measures are described on page 5 of this Opinion. They are incorporated (where relevant) into every permit as part of the terms and conditions to which a researcher must adhere.

<u>Observation</u>

For some studies, ESA-listed fish will be observed in-water (i.e., snorkel surveys). Direct observation is the least disruptive method for determining presence/absence of the species and estimating their relative abundance. Its effects are also generally the shortest-lived among any of the research activities discussed in this section. Typically, a cautious observer can effectively obtain data without disrupting the normal behavior of a fish. Fry and juveniles frightened by the turbulence and sound created by observers are likely to seek temporary refuge in deeper water or behind or under rocks or vegetation. In extreme cases, some individuals may temporarily leave a particular pool or habitat type when observers are in their area. Researchers minimize the amount of disturbance by moving through streams slowly—thus allowing ample time for fish to reach escape cover; though it should be noted that the research may at times involve observing adult fish—which are more sensitive to disturbance. During some of the research activities discussed below, redds may be visually inspected, but no redds will be walked on. Harassment is the primary form of take associated with these observation activities, and few if any injuries or deaths are expected to occur—particularly in cases where the observation is to be conducted solely by researchers on the stream banks rather than in the water. There is little a researcher can do to mitigate the effects associated with observation activities because those effects are so minimal. In general, all they can do is move with care and attempt to avoid disturbing sediments, gravels, and, to the extent possible, the fish themselves.

<u>Capture/handling</u>

Capturing and handling fish causes them stress—though they typically recover fairly rapidly from the process and therefore the overall effects of the procedure are generally short-lived. The primary contributing factors to stress and death from handling are excessive doses of anesthetic, differences in water temperatures (between the river and wherever the fish are held), dissolved oxygen conditions, the amount of time that fish are held out of the water, and physical trauma. Stress on salmonids increases rapidly from handling if the water temperature exceeds 18°C or dissolved oxygen is below saturation. Fish that are transferred to holding tanks can experience trauma if care is not taken in the transfer process, and fish can experience stress and injury from overcrowding in traps if the traps are not emptied on a regular basis. Debris buildup at traps can also kill or injure fish if the traps are not monitored and cleared on a regular basis.

Based on prior experience with the research techniques and protocols that would be used to conduct the proposed scientific research, no more than five percent of the juvenile salmonids encountered are likely to be killed as an indirect result of being captured and handled and, in most cases, that figure will not exceed three percent. In addition, it is not expected that more than one percent of the adults being handled will die. In any case, all researchers will employ the mitigation measures described earlier (page 5) and thereby keep adverse effects to a minimum. Finally, any fish indirectly killed by the research activities in the proposed permits may be retained as reference specimens or used for analytical research purposes.

<u>Electrofishing</u>

Electrofishing is a process by which an electrical current is passed through water containing fish in order to stun them—thus making them easier to capture. It can cause a suite of effects ranging form simple harassment to actually killing the fish (adults and juveniles) in an area where it is occurring. The amount of unintentional mortality attributable to electrofishing may vary widely depending on the equipment used, the settings on the equipment, and the expertise of the technician. Electrofishing can have severe effects on adult salmonids. Spinal injuries in adult salmonids from forced muscle contraction have been documented. Sharber and Carothers (1988) reported that electrofishing killed 50 percent of the adult rainbow trout in their study. The long-term effects electrofishing has on both juvenile and adult salmonids are not well understood, but long experience with electrofishing indicates that most impacts occur at the time of sampling and are of relatively short duration.

The effects electrofishing will have on MCR steelhead would be limited to the direct and indirect effects of exposure to an electric field, capture by netting, holding captured fish in aerated tanks, and the effects of handling associated with transferring the fish back to the river (see the next subsection for more detail on capturing and handling effects). Most of the studies on the effects of electrofishing on fish have been conducted on adult fish greater than 300 mm in length (Dalbey et al. 1996). The relatively few studies that have been conducted on juvenile salmonids indicate that spinal injury rates are substantially lower than they are for large fish. Smaller fish intercept a smaller head-to-tail potential than larger fish (Sharber and Carothers 1988) and may therefore be subject to lower injury rates (e.g., Hollender and Carline 1994, Dalbey et al. 1996, Thompson et al. 1997). McMichael et al. (1998) found a 5.1% injury rate for juvenile MCR steelhead captured by electrofishing in the Yakima River subbasin. The incidence and severity of electrofishing damage is partly related to the type of equipment used and the waveform produced (Sharber and Carothers 1988, McMichael 1993, Dalbey et al. 1996, Dwyer and White 1997). Continuous direct current (DC) or low-frequency ($\leq$30 Hz) pulsed DC have been recommended for electrofishing (Fredenberg 1992, Snyder 1992 and 1995, Dalbey et al. 1996) because lower spinal injury rates, particularly in salmonids, occur with these waveforms (Fredenberg 1992, McMichael 1993, Sharber et al. 1994, Dalbey et al. 1996). Only a few recent studies have examined the long-term effects of electrofishing on salmonid survival and growth

(Ainslie et al. 1998, Dalbey et al. 1996). These studies indicate that although some of the fish suffer spinal injury, few die as a result. However, severely injured fish grow at slower rates and sometimes they show no growth at all (Dalbey et al. 1996).

NOAA Fisheries' electrofishing guidelines (NOAA Fisheries 2000c) will be followed in all surveys requiring this procedure. The guidelines require that field crews be trained in observing animals for signs of stress and shown how to adjust electrofishing equipment to minimize that stress. Electrofishing is used only when other survey methods are not feasible. All areas for stream and special needs surveys are visually searched for fish before electrofishing may begin. Electrofishing is not done in the vicinity of redds or spawning adults. All electrofishing equipment operators are trained by qualified personnel to be familiar with equipment handling, settings, maintenance, and safety. Operators work in pairs to increase both the number of fish that may be seen and the ability to identify individual fish without having to net them. Working in pairs also allows the researcher to net fish before they are subjected to higher electrical fields. Only DC units will be used, and the equipment will be regularly maintained to ensure proper operating condition. Voltage, pulse width, and rate will be kept at minimal levels and water conductivity will be tested at the start of every electrofishing session so those minimal levels can be determined. Due to the low settings used, shocked fish normally revive instantaneously. Fish requiring revivification will receive immediate, adequate care.

The preceding discussion focused on the effects of using a backpack unit for electrofishing and the ways those effects will be mitigated. It should be noted, however, that in larger streams and rivers electrofishing units are sometimes mounted on boats. These units often use more current than backpack electrofishing equipment because they need to cover larger (and deeper) areas and, as a result, can have a greater impact on fish. In addition, the environmental conditions in larger, more turbid streams can limit researchers' ability to minimize impacts on fish. For example, in areas of lower visibility it is difficult for researchers to detect the presence of adults and thereby take steps to avoid them. Because of its greater potential to harm fish, and because NOAA Fisheries has not published appropriate guidelines, boat electrofishing has not been given a general authorization under NOAA Fisheries' recent ESA section 4(d) rules. However, it is expected that guidelines for safe boat electrofishing will be in place in the near future. And in any case, all researchers intending to use boat electrofishing will use all means at their disposal to ensure that a minimum number of fish are harmed (these means will include a number of long-established protocols that will eventually be incorporated int NOAA Fisheries' guidelines).

<u>Tagging/marking</u>

Techniques such as PIT-tagging (passive integrated transponder tagging), coded wire tagging, fin-clipping, and the use of radio transmitters are common to many scientific research efforts using ESA-listed species. All sampling, handling, and tagging procedures have an inherent potential to stress, injure, or even kill the marked fish. This section discusses each of the marking processes and its associated risks.

A PIT tag is an electronic device that relays signals to a radio receiver; it allows salmonids to be identified whenever they pass a location containing such a receiver (e.g., any of several dams) without researchers having to handle the fish again. The tag is inserted into the body cavity of the fish just in front of the pelvic girdle. The tagging procedure requires that the fish be captured and extensively handled, therefore any researchers engaged in such activities will follow the conditions listed in the Description of the Proposed Actions section (as well as any permit-specific terms and conditions) to ensure that the operations take place in the safest possible manner. In general, the tagging operations will take place where there is cold water of high quality, a carefully controlled environment for administering anesthesia, sanitary conditions, quality control checking, and a carefully regulated holding environment where the fish can be allowed to recover from the operation.

PIT tags have very little effect on growth, mortality, or behavior. The few reported studies of PIT tags have shown no effect on growth or survival (Prentice et al. 1987; Jenkins and Smith 1990; Prentice et al. 1990). For example, in a study between the tailraces of Lower Granite and McNary Dams (225 km), Hockersmith et al. (2000) concluded that the performance of yearling chinook salmon was not adversely affected by gastrically- or surgically implanted sham radio tags or PIT-tags. Additional studies have shown that growth rates among PIT-tagged Snake River juvenile fall chinook salmon in 1992 (Rondorf and Miller 1994) were similar to growth rates for salmon that were not tagged (Conner et al. 2001). Prentice and Park (1984) also found that PIT-tagging did not substantially affect survival in juvenile salmonids.

Another other primary method for tagging fish is to implant them with radio tags. There are two main ways to accomplish this and they differ in both their characteristics and consequences. First, a tag can be inserted into a fish's stomach by pushing it past the esophagus with a plunger. Stomach insertion does not cause a wound and does not interfere with swimming. This technique is benign when salmon are in the portion of their spawning migrations during which they do not feed (Nielsen, 1992). In addition, for short-term studies, stomach tags allow faster post-tagging recovery and interfere less with normal behavior than do tags attached in other ways.

Permit-specific Effects

Permit 1317—Modification 1

Permit 1317 would allow the USGS to annually capture up to 20 adult MCR steelhead and capture and mark up to 1500 MCR juvenile steelhead in the Toppenish wildlife refuge, Washington. Up to 75 juveniles and three adults may be killed during the course of the research. The primary method of capturing the steelhead would involve the use of fyke-type traps, though the researchers may also use snorkeling, baited minnow traps, or electrofishing if the fyke traps fail to capture enough juveniles. The captured fish would be anesthetized, measured, weighed, and checked for PIT-tags. Fish that do not already have PIT-tags will be given one. Up to 60 of the captured fish will also be non-lethally sampled for gill tissue—that is, researchers will clip a small piece of gill tissue from these fish. In the event of major flooding and dike over-topping, the USGS may also desire to radio-tag steelhead above the refuge. These fish would be tracked through the refuge using a combination of fixed and mobile radio-tracking gear. The fyke-net traps will be checked daily and any adults that are inadvertently captured would be immediately released unharmed. The strong probability is that any such fish will be kelts, i.e., fish that have already spawned and are therefore likely to die in the near future.

Because the research would all take place in a limited area in the Yakima River subbasin, the context for determining the effect is (a) the 69,433 juvenile MCR steelhead expected to reach the Columbia River above McNary Dam (Schiewe 2002), and (b) the approximately 1150 adults (average) that returned to the Yakima system from 1997 to 2000 (the most recent years for which data exist) (NOAA Fisheries 2002c). The death of, at most, 75 juvenile MCR steelhead (5% of the sample captured) would mean a 0.11% reduction in the above-McNary Dam population. And the number would only be that high if electroshocking is used (unlikely) or other unforseen circumstances occur (e.g., delayed mortality as a result of injury). In a nearly identical study in 2001, the USGS found a total mortality rate of less than 3.5%—as opposed to the 5% rate being used here. Therefore, it is likely that even fewer than 0.11% of the steelhead outmigration above McNary will be killed during this research—perhaps as little as 0.07% or less. And that number could be even smaller given that the Yakima system alone produced an average of nearly 100,000 steelhead smolts in the five years between 1994 and 1998 (NOAA Fisheries 2002c). Thus, the effect of this loss on the Yakima River population would be negligible. This is especially true when the loss is placed in the context of the entire ESU's outmigration.

The death of three adult steelhead out of the approximately 1,150 that have returned on average in recent years would also constitute a nearly-negligible loss (0.3% of the run). The effect of this loss is essentially unmeasurable—especially if placed in the context of the ESU as a whole—even if the fish are assumed to be pre-spawning adults. But because they would almost certainly be in a post-spawning state and highly unlikely to survive in any case, their loss would be negligible.

Even though the adverse effects of the research are exceedingly small, the USGS will work to minimize them even further. Aside from the mitigation measures mentioned earlier, they will constantly monitor their sampling methods and results and ensure that MCR steelhead injuries are kept to a minimum. In addition, if they find MCR steelhead juveniles in areas with lethal conditions (e.g., stranded in an area with high water temperatures), they will move the fish to a safer location.

Permit 1345

Permit 1345 would allow the WDFW to annually capture, handle, and release up to 114 juvenile MCR steelhead and handle up to 7 adults. As many as four of the juveniles may be killed during the research; none of the adults would be killed. The fish would be captured using a boat-based electrofishing unit. The captured fish would be anesthetized, measured, weighed, allowed to recover, and released. If any adults are encountered, the electrofishing will immediately cease and the fish will be allowed to escape.

Because the research would all take place in a limited area in the Yakima River subbasin, the context for the effect is the 69,433 juvenile MCR steelhead expected to reach the Columbia River above McNary Dam (Schiewe 2002). The loss of four juveniles would thus represent, at most 0.006% of that portion of the outmigration. And that number could be even smaller given that the Yakima system alone produced an average of nearly 100,000 steelhead smolts in the five years between 1994 and 1998 (NOAA Fisheries 2002c). The negative effect of this loss is thus inestimable at the subbasin scale and it is even less discernible at the ESU scale.

Though the negative effects of the research are vanishingly small, the researchers will work to reduce them even further. The researchers will adhere to NOAA Fisheries' electrofishing guidelines and will maintain their gear at the lowest possible setting during the electrofishing runs. Furthermore, all areas proposed for electrofishing will be visually surveyed, and if any spawning redds are located they will be flagged and avoided to keep from affecting adults any more than is absolutely necessary.

Permit 1365

Permit 1365 would allow the CTUIR to annually capture, measure, radio tag and release up to 45 adult listed MCR steelhead. As many as four of these fish may be killed during the course of the research. The fish would be captured using a variety of methods: angling with barbless hooks, seining, trapping, and dip netting. Once captured, they will be measured, judged as to their condition, and, if deemed to be in good condition and longer than 520 mm, will be fitted with radio tags. They will then be released and tracked with both mobile and fixed tracking equipment to determine where they go in the subbasin, how long it takes them to pass various barriers, what passage routes they use, etc.

The researchers will attempt to capture the fish in the Walla Walla River below its confluence with Mill Creek. If they cannot gather enough fish there, they may use alternate locations in the Touchet River, Mill Creek, or Yellowhawk Creek. It is not known how many listed MCR steelhead return to the Walla Walla subbasin. However, recent returns (1995-2000) to the Touchet River and the South Fork of the Walla Walla have averaged well over 300 fish and 360 fish, respectively (NOAA Fisheries 2002c). In addition, Mill Creek and other, smaller tributaries in the system produce another few hundred adult MCR steelhead among them. Therefore, the subbasin conservatively produces more than nine hundred adults in total. Thus, the number of fish that would—at most—be killed by the CTUIR research is something on the order of 0.4%. It is impossible to determine what negative effect that loss would have on the Walla Walla subbasin MCR steelhead population, let alone what effect it would have on the ESU as a whole.

Though the negative effects of the research are negligible, the researchers will take the following steps to reduce them even further: (1) The fish will not be anesthetized because drugged fish are more vulnerable to being harvested by anglers; (2) all transmitters will be lubricated with olive oil to aid their insertion; (3) only fish judged to be in good condition will be tagged; (4) all tagging will take place in the presence of a trained field supervisor; and (5) all personnel involved in the capture process will be specially trained in the proper techniques of capturing and handling the fish.

Permit 1367

Permit 1367 would allow the NWFSC to capture, identify, and release up to 15 juvenile MCR steelhead. One of these fish may be killed as a result of the research. The NWFSC would use backpack electrofishing equipment to capture the fish. Because the research does not target MCR steelhead, the captured fish would simply be identified, counted, allowed to recover for a brief period, and then released back into the Yakima River. No anesthesia would be used.

Because this research would take place in the Yakima River, the context for determining the effect is the 69,433 juvenile MCR steelhead expected to reach the Columbia River above McNary Dam (Schiewe 2002). The loss of one juvenile from the system would represent, at most 0.0014% of that portion of the outmigration. And that number could be even smaller given that the Yakima system alone produced an average of nearly 100,000 steelhead smolts in the five years between 1994 and 1998 (NOAA Fisheries 2002c). The negative effect associated with this loss is inestimable at the subbasin scale and it is even less discernible at the ESU scale.

Though the negative effect that would be generated by the research is essentially negligible, the NWFSC will work to reduce it even further. The electrofishing units will be kept at the lowest possible setting, the researchers will take care to see that the captured fish recover fully before releasing them, and they will concentrate their efforts in areas used more by juvenile spring chinook than by steelhead.

Permit 1382

Permit 1382 would allow USU to observe (by snorkeling) approximately 150 juvenile MCR steelhead and capture, handle, and release another 150 more. As many as seven juvenile MCR steelhead may be killed during the course of this research. The USU researchers would use canoe-mounted electrofishing equipment to capture the fish. Because the research does not target MCR steelhead, the captured fish would simply be identified, counted, allowed to recover for a brief period, and then released back into the Walla Walla River.

It is not known how many young MCR steelhead the Walla Walla River subbasin produces every year. But the context for determining the effect is the 69,433 juvenile MCR steelhead expected to reach the Columbia River above McNary Dam (Schiewe 2002). The loss of seven juveniles from the system would thus represent, at most 0.01% of that portion of the outmigration. And that number could be even smaller given that the Yakima system alone (the other major MCR steelhead producing system above McNary) produced an average of nearly 100,000 steelhead smolts in the five years between 1994 and 1998 (NOAA Fisheries 2002c). Thus the negative effect of losing seven juvenile MCR steelhead is inestimable at the subbasin scale and it is even less discernible at the ESU scale.

Though the negative effect that would be generated by the research is essentially negligible, the USU researchers will work to reduce it even further. The electrofishing units will be kept at the lowest possible setting, the fish will be handled as little as possible, fish densities will be kept low in the work troughs and handling tanks, and anesthetic levels will be carefully monitored.

Permit 1383

Permit 1383 would allow the USGS to (a) observe (by snorkeling) up to 4,100 juvenile MCR steelhead and 30 adults, and (b) capture, handle, and release an additional 2,050 juveniles. As many as 102 of the captured juveniles may be killed during the course of the research. The researchers will use a variety of methods to capture the fish: electrofishing, seining, minnow trapping, and angling. Though MCR steelhead are not the target of this research, they will still be anesthetized, measured, examined, allowed to recover, and released.

It is not known how many MCR steelhead are produced in the tributary systems where this research will take place. One estimate has Fifteenmile Creek alone producing 26,000 smolts (NOAA Fisheries 2002c), and it is by no means even the largest producer in the area. (The Klickitat River is probably the largest producer; other local steelhead streams include Mosier Creek, Eightmile Creek, and the White Salmon and Little White Salmon Rivers.) So all that can be said with certainty is that the area covered by this research will produce, at minimum, many tens of thousands of smolts. If the number produced is even 30,000 (barely more than Fifteenmile Creek produces on it's own), the death of 102 juveniles would represent the loss of only 0.34% of that portion of the outmigration—and if all area's production could be truly factored in, the 0.34% figure might well be as much as an order of magnitude lower. It cannot be determined what, if any, net negative effect this loss would have on the MCR steelhead populations in the Columbia River tributaries between The Dalles and Bonneville Dams. It is even more difficult to discern what negative impact this loss would have on the MCR steelhead ESU as a whole.

Though the negative effect that would be generated by the research is essentially negligible, the NWFSC researchers will work to reduce it even further. They will use state-of-the-art electrofishing equipment and, aside from following NOAA Fisheries' guidelines, will also sample the minimum possible number habitat units and make the fewest possible passes during each sample. Further, the fish will be held under optimal conditions and released as rapidly as possible. Finally, any fish killed during the survey will be taken to the USFWS's Lower Columbia Fish Health Center for full disease profiling.

<u>Permit 1386</u>

Permit 1386 would allow the WDOE to capture—using a variety of net types and boat electrofishing equipment—handle, and release up to 40 juvenile and eight adult MCR steelhead. As many as one of the juveniles would be allowed to be killed as an indirect result of the research. None of the adults would be killed. Because MCR steelhead are not the target of the research, any that are caught will be released immediately. If, during the boat electrofishing operation, captured MCR steelhead are deemed to require a recovery period before release, they will be held in a livewell until they can safely be reintroduced to the river.

It is not known how many MCR steelhead smolts migrate down out of the Klickitat system every year. A very conservative estimate shows a recent average adult return of 260 fish to the system (NOAA Fisheries 2002c). If the female returns (approximately 130) each produce only 500 eggs that survive to the smolt stage, then the research will kill one out of 65,000 or, about 0.001 percent. Even if that number were an order of magnitude larger, the effect on the population would still be negligible, and the effect on the ESU would be even less discernable.

Though the negative effect that would be generated by the research is essentially negligible, the WDOE researchers will work to reduce it even further. They will use state-of-the-art electrofishing equipment and will follow NOAA Fisheries' guidelines in its use. Electrofishing equipment will be turned off if any adult MCR steelhead are observed. All nets will be carefully trended and cleared of captured fish every two hours. In addition, the research will not take place at a time or in areas where listed MCR adults are spawning.

<u>Research Action 1</u>

Under Research Action 1, biologists from the CTWSRO would capture up to 20 adult MCR steelhead during the course of research designed to capture and mark fall chinook salmon. As many as two adult MCR steelhead may be killed during this operation. The researchers would use a gill net to capture the fish and, because MCR steelhead are not the target of the research, any that are caught would be released immediately. However, the nature of the netting operation is such that a small number of steelhead are expected to be killed.

Because the research would take place in the Deschutes River, the context for determining its effect is the estimated 6,581 (average) escapement above Sherars Falls each year over the last four years (ODFW 2002). The death of two adult steelhead would thus constitute—at most—0.03 percent of the Deschutes River population. In actuality, that figure is probably a good deal smaller because a number of steelhead spawn below Sherars Falls and the 6,581 figure represents only those that spawn above it. But regardless of whether the actual percentage is lower, it would still have a minimal effect on the Deschutes River population and a completely negligible effect on the ESU as a whole.

Though the research would generate only an extremely small negative effect, the researchers would work to reduce it even further. They will avoid areas where steelhead are known to congregate, use a net with a large mesh (8-inch) in order to catch fewer steelhead, and will observe the net constantly while it is in the water. It is expected that at least two of the net's float corks will bob when a fish becomes entangled, so the observers will be able to quickly haul the net in when it has caught a fish. During the night and early morning hours the net will be scanned every five minutes with a 1000-watt halogen lamp. The net will also be physically checked every 15 to 30 minutes to ensure no that fish are captured undetected and to remove debris. Crews of two will remain on site 24 hours a day; crew rotations will vary from four to seven days. Further, the crew will constantly monitor the water temperature with continuously recording thermographs and will use a hand-held thermometer to determine surface water temperatures when the net is deployed and retrieved. No gillnetting will take place if the water temperature exceeds 18.5° C. All captured fish will be released in a calm eddy 200 m upstream of the gillnet.

Finally, the researchers will experiment with the use of a submersible water pump to revive lethargic fish after they are removed from the net. Water from the river will be pumped through the fish's gills while they are held in an onboard trough. The gill irrigation will continue until the fish become lively and are able to swim freely before they are released. The ODFW has successfully used this procedure has to revive lethargic steelhead and salmon in the experimental commercial spring chinook salmon tangle net fishery.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions not involving Federal activities that are reasonably certain to occur within the action area subject to this consultation. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Act.

State, tribal and local government actions will likely to be in the form of legislation, administrative rules or policy initiatives. Government and private actions may encompass changes in land and water uses—including ownership and intensity—any of which could impact listed species or their habitat. Government actions are subject to political, legislative, and fiscal uncertainties. These realities, added to the geographic scope of the action area which encompasses numerous government entities exercising various authorities and the many private landholdings, make any analysis of cumulative effects difficult and speculative. For more information on the various efforts being made at the local, tribal, state, and national levels to conserve MCR steelhead and other listed species, please see NOAA Fisheries (2002a).

Non-Federal actions are likely to continue affecting listed species. The cumulative effects in the action area are difficult to analyze considering the large geographic scope of this opinion, the different resource authorities in the action area, the uncertainties associated with government and private actions, and the changing economies of the region. Whether these effects will increase or decrease is a matter of speculation; however, based on the trends identified in this section, the adverse cumulative effects are likely to increase. Although state, tribal and local governments have developed plans and initiatives to benefit listed fish, they must be applied and sustained in a comprehensive way before NOAA Fisheries can consider them “reasonably foreseeable” in its analysis of cumulative effects.

Integration and Synthesis of Effect

The vast majority (approximately 95%) of the MCR fish that will be captured, handled, observed, etc., during the course of the proposed research (out of a total of 3,869 juvenile fish and 100 adults) are expected to survive with no long-term effects. Moreover, most capture, handling, and holding methods will be minimally intrusive and of short duration. Because so many of the captured fish are expected to survive the research actions and so few (a maximum of 1.0%) of the total MCR steelhead outmigration will be affected in even the slightest way, it is likely that no adverse effects will result from these actions at either the population or the ESU level. Therefore, adverse effect must be expressed in terms of the individual fish that may be killed during the various permitted activities. The following table summarizes these effects for each permit and Research Action 1.

Table 2. Maximum Annual Takes of Threatened MCR Steelhead

Permit Action	Adult					Juvenile				
	HANDLE			MORTALITY		HANDLE			MORTALITY	
	Electrofish and Release w/o capture	C,H,R	C,T/M,R	DIRECT	INDIRECT	Electrofish and release w/o capture	C,H,R	C,T/M,R	DIRECT	INDIRECT
1317	0	20	0		3		0	1,500		75
1345	7	0	0		0		114	0		4
1365	0	0	45		4		0	0		0
1367	0	0	0		0		15	0		1
1382	0	0	0		0		150	0		7
1383	0	0	0		0		2,050	0		102
1386	8	0	0		0		40	0		1
RA-1	0	20	0		2		0	0		0
TOTALS	15	40	45		9		2,369	1,500		190

Key: CFT = Collect for Transport; C,H,R = Capture, Handle, Release; C, T/M, R = Capture, Tag/mark, Release.

If the total amount of estimated lethal take (juveniles) for all research activities—190 juvenile MCR steelhead—is expressed as a fraction of the 379,264 fish expected to reach The Dalles Dam, it represents a loss of 0.05% of the run. However, and for a number of reasons, that percentage is in actuality probably much smaller. First, as stated earlier in the Opinion, there are no reliable estimates for the number of MCR steelhead produced in the tributaries between The Dalles and Bonneville Dams. Therefore, the anticipated outmigration of MCR steelhead is some number larger than the 379,264 fish expected to arrive at The Dalles Dam. It is impossible to say how much bigger that number would be if we had reliable figures for the Klickitat and Little White Salmon Rivers and Fifteenmile and Mosier Creeks and other, smaller tributaries between The Dalles and Bonneville Dams, but it is certain that using the 379,264 figure to represent the entire MCR steelhead outmigration is a very conservative estimate (see individual permits for rough estimates of outmigrations from these lower tributaries). Second, it is important to remember that every estimate of lethal take for the proposed studies has purposefully been inflated to account for potential accidental deaths and it is therefore very likely that fewer than 190 juveniles will be killed by the research—possibly many fewer. Third, some of the studies will specifically affect steelhead in the smolt stage, but others will not. These latter studies are described as affecting "juveniles," which means they may affect steelhead yearlings, parr, or even fry: life stages represented by many more individuals than reach the smolt stage—perhaps as much as an order of magnitude more. Therefore the 0.05% figure was derived by (a) underestimating the actual number of outmigrating MCR steelhead smolts, (b) overestimating the number of fish likely to be killed, and (c) treating each dead MCR steelhead as a smolt when some of them clearly won't be. Thus the actual number of juvenile MCR steelhead the research is likely to kill is undoubtedly smaller than 0.05% of the outmigration—perhaps as little as half (or less) of that figure.

But even if the entire 0.05% of the juvenile MCR steelhead population were killed, and they were *all* treated as smolts, it would be very difficult to translate that number into an actual effect on the species. Even if the subject were one adult killed out of a population of two thousand (0.05% is another way of expressing the fraction “one two-thousandth”), it would be hard to resolve an adverse effect. And in this instance, that effect is even smaller because the loss of a smolt is not equivalent to the loss of an adult in terms of species survival and recovery. This is due to the fact that a great many smolts die before they can mature into adults. In the case of Deschutes River summer steelhead (part of the MCR steelhead ESU), only 1-12% of the outmigrating smolts survived to return as adults between 1976 and 1994 (and in most years, the number was near the lower end of that range) (ODFW and WDFW 1998). This indicates that (conservatively) something near 90% of the smolts leaving the Deschutes River do not survive to return as adults. If this number holds even approximately true for the ESU as a whole, it means that some 90% of the 0.05% figure would likely be killed during the natural course of events. Therefore the research, even in the worst possible scenario, would kill likely the (maximum) equivalent of one adult out of twenty thousand—a negligible adverse effect on the ESU.

The population-specific effects associated with the adult portion of the lethal take the permits would allow is described in the analysis of Permits 1317 and 1365 and Research Action 1. Taken together, they represent a loss of, at most, nine adults. Stated another way, the actions would—very conservatively—constitute a maximum loss of 0.3% of the returning Yakima subbasin steelhead, 0.4% of the returning Walla Walla subbasin steelhead, and 0.03% of the returning Deschutes subbasin steelhead, respectively. It is impossible to determine the negative effect this small amount of take would have on the ESU as a whole—particularly given the fact that three of those adults (in the Yakima subbasin) will more than likely be spawned-out and on the verge of dying in any case.

Nonetheless, regardless of its magnitude, the negative effect associated with the proposed permits (in terms of both juvenile and adult losses) must be juxtaposed with the benefits to be derived from the research (see descriptions of the individual permits). Those benefits range from monitoring improved salmonid passage in the Walla Walla subbasin (Permit 1365) to providing basic information on the means to improve MCR steelhead habitat (Permit 1383). In all, the fish will derive some benefit from every permit considered in this Opinion. The amount of benefit will vary, but in some cases it may be significant. Therefore, in deciding whether to issue the permits considered here, NOAA Fisheries must compare the tangible benefits they will produce (some of which are potentially significant) with the negligible adverse effects they will cause. Moreover, NOAA Fisheries must weigh similar factors (benefit versus adverse effect) when deciding whether the contemplated actions will appreciably reduce the likelihood of the MCR steelhead’s survival and recovery—the critical determination in issuing any biological opinion.

Conclusions

After reviewing the current status of the threatened MCR steelhead, the environmental baseline for the action area, the effects of the proposed section 10(a)(1)(A) permit actions, proposed Research Action 1, and cumulative effects, it is NOAA Fisheries' biological opinion that issuing the proposed permits is not likely to jeopardize the continued existence of threatened MCR steelhead.

Coordination with the National Ocean Service

None of the activities contemplated in this Biological Opinion will be conducted in or near a National Marine Sanctuary. Therefore, these activities will not have an adverse effect on any National Marine Sanctuary.

INCIDENTAL TAKE STATEMENT

Section 9 and the regulations implementing section 4(d) of the ESA prohibit any take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of ESA-listed species without a specific permit or exemption. When a proposed Federal action is found to be consistent with Section 7(a)(2) of the ESA (i.e., the action is found not likely to jeopardize the continued existence of an ESA-listed species or result in the destruction or adverse modification of critical habitat) and that action may incidentally take individuals of an ESA-listed species, NOAA Fisheries will issue an Incidental Take Statement (ITS) specifying the impact of any incidental take of the endangered or threatened species.

The ITS provides reasonable and prudent measures that are necessary to minimize impacts, and sets forth terms and conditions with which an action agency or permit applicant must comply in order to implement the reasonable and prudent measures. "Incidental" take is that which occurs while an agency or an applicant is engaged in an otherwise lawful activity; it is exempted from the take prohibition by section 7(o) of the ESA, but only if that take is in compliance with the specified terms and conditions. The measures described below are non-discretionary and must be undertaken by NOAA Fisheries for the exemption in section 7(o)(2) to apply. If NOAA Fisheries (1) fails to cause the terms and conditions to be implemented or (2) fails to require the action agency or applicant to adhere to the enforceable terms and conditions of this ITS, the protective coverage of Section 7(o)(2) may lapse. In order to monitor the impact of incidental takes, the action agency or applicant must report the progress of its actions and their impacts on the species to NOAA Fisheries as specified in this ITS [50 CFR 402.14(I)(3)].

Amount or Extent of Incidental Take

The annual incidental takes of threatened MCR steelhead can be specified for only one action within the scope of this consultation—Research Action 1: The scientific research activities conducted by the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) may incidentally take a maximum annual total of 20 adult MCR steelhead. Two of these fish may be killed as a result of the incidental take. In the accompanying biological opinion, NOAA Fisheries determined that this level of take is not likely to jeopardize MCR steelhead.

If this specified maximum incidental take level is reached or exceeded, NOAA Fisheries may cause the scientific research activities to cease until this consultation is reinitiated or a new consultation is completed.

Reasonable and Prudent Measures

NOAA Fisheries believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of taking ESA-listed species. The action agency is directed to (a) use all possible care to minimize the effects of the operations, (b) use experienced staff for all fish sampling operations, (c) cooperate with other researchers during this sampling and to report the results of the sampling to NOAA Fisheries and all other interested parties, and (d) demonstrate that the project is fulfilling its purpose of generating important data on ESA-listed species.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the CTWSRO must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting and monitoring actions. These terms and conditions are non-discretionary.

1. ESA-listed fish must be handled with extreme care and kept in water to the maximum extent possible during sampling and processing procedures. Adequate circulation and replenishment of water in holding units is required. When using gear that capture a mix of species, ESA-listed fish must be released as soon as possible after being captured to minimize the duration of handling stress.

2. ESA-listed juvenile fish must not be handled if the water temperature exceeds 18.5 degrees centigrade at the capture site.

3. The Permit Holder must not intentionally kill or cause to be killed any ESA-listed species that may be incidentally taken.

4. Due caution must be exercised during gillnetting operations to avoid disturbing, disrupting, or harassing ESA-listed adult salmon and steelhead when they are spawning. Whenever possible, walking in the stream must be avoided, especially in areas where ESA-listed salmon and/or steelhead are likely to spawn.

5. The gillnet to be used must be constantly observed while it is in the water and must be checked physically every 15 to 30 minutes.

6. The researchers must use a submersible water pump to help revive lethargic MCR steelhead that have been captured in the net.

7. Researchers must report whenever the authorized level of incidental take is exceeded, or if circumstances indicate that such an event is imminent. Notification should be made as soon as possible, but no later than two days after the authorized level of take is exceeded. Researchers must then submit a detailed written report. Pending review of these circumstances, NOAA Fisheries may suspend research activities and/or reinitiate consultation to allow research activities to continue.

8. Researchers must submit a post-season report to NOAA Fisheries summarizing the results of the research and the success of the research relative to its goals. The report must include a detailed description of activities, the total number of fish taken at each location, an estimate of the number of ESA-listed fish taken at each location, the manner of take, and the dates/locations of take.

Conservation Recommendations

Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on ESA-listed species or critical habitat, to develop additional information, or to assist Federal agencies in complying with their obligations under section 7(a)(1) of the ESA. NOAA Fisheries believes the following conservation recommendation is consistent with these obligations, and therefore should be implemented:

> NOAA Fisheries shall monitor actual annual takes of ESA-listed fish species—as provided to NOAA Fisheries in annual reports or by other means—and shall adjust annual permitted take levels if they are deemed to be excessive or if cumulative take levels are determined to operate to the disadvantage of the ESA-listed species.

Reinitiation of Consultation

Consultation must be reinitiated if: The amount or extent of the specified annual take is exceeded or is expected to be exceeded; new information reveals effects of the actions that may affect the ESA-listed species in a way not previously considered; a specific action is modified in a way that causes an effect on the ESA-listed species that was not previously considered; or a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16).

MAGNUSON-STEVENS ACT ESSENTIAL FISH HABITAT CONSULTATION

"Essential fish habitat" (EFH) is defined in section 3 of the Magnuson-Stevens Act (MSA) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." NOAA Fisheries interprets EFH to include aquatic areas and their associated physical, chemical and biological properties used by fish that are necessary to support a sustainable fishery and the contribution of the managed species to a healthy ecosystem.

The MSA and its implementing regulations at 50 CFR 600.920 require a Federal agency to consult with NOAA Fisheries before it authorizes, funds or carries out any action that may adversely effect EFH. The purpose of consultation is to develop a conservation recommendation(s) that addresses all reasonably foreseeable adverse effects to EFH. Further, the action agency must provide a detailed, written response NOAA Fisheries within 30 days after receiving an EFH conservation recommendation. The response must include measures proposed by the agency to avoid, minimize, mitigate, or offset the impact of the activity on EFH. If the response is inconsistent with NOAA Fisheries' conservation recommendation the agency must explain its reasons for not following the recommendations.

The objective of this consultation is to determine whether the proposed actions, the funding and issuance of scientific research permits under section 10(a)(1)(A) of the ESA for activities within the states of Oregon and Washington, are likely to adversely affect EFH. If the proposed actions are likely to adversely affect EFH, a conservation recommendation(s) will be provided.

Identification of Essential Fish Habitat

The Pacific Fishery Management Council (PFMC) is one of eight Regional Fishery Management Councils established under the Magnuson-Stevens Act. The PFMC develops and carries out fisheries management plans for Pacific coast groundfish, coastal pelagic species, and salmon off the coasts of Washington, Oregon, and California. Pursuant to the MSA, the PFMC has designated freshwater EFH for Pacific salmon; it includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (i.e. natural waterfalls in existence for several hundred years)(PFMC 1999). Marine EFH for Pacific salmon in Oregon and Washington includes all estuarine, nearshore and marine waters within the western boundary of the U.S. Exclusive Economic Zone (EEZ), 200 miles offshore.

Proposed Action and Action Area

For this EFH consultation the proposed actions and action area are as described in detail in the ESA consultation above. The actions are the funding and issuance of a number of scientific research permits pursuant to section 10(a)(1)(A) of the ESA and one proposed research action in the Deschutes River, Oregon. The proposed action area is the middle Columbia River basin. A more detailed description and identification of EFH for salmon is found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). The impacts of the proposed actions on these species' EFH are assessed based on this information.

Effects of the Proposed Action

Based on information submitted by the action agencies and permit applicants, as well as NOAA Fisheries' analysis in the ESA consultation above, NOAA Fisheries believes that the effects of this action on EFH are likely to be within the range of effects considered in the ESA portion of this consultation.

Conclusion

Using the best scientific information available and based on its ESA consultation above, as well as the foregoing EFH consultation sections, NOAA Fisheries has determined that the proposed actions are not likely to adversely affect Pacific salmon EFH.

EFH Conservation Recommendation

NOAA Fisheries has no conservation recommendations to make in this instance.

Consultation Renewal

The action agencies must reinitiate EFH consultation if plans for these actions are substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for the EFH conservation recommendations (50 CFR Section 600.920(k)).

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